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Effects of Music on Mood During Basketball Play in Junior High School Physical Education

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Introduction

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A goal for education across all content areas is to create a positive learning environment that will give students opportunities to learn. One opportunity educators have, and continue to use, to assist in student learning is music. Wilkinson (2013) stated that having the “right kind of music” in educational settings has great promise in aiding students in retention and learning. Additionally, Wilkinson (2013) continues by maintaining that the right kind of music has the potential to reduce stress, lessen depression and anxiety, improve mood, and enhance a sense of comfort and relaxation. Haslam and Price (1998) found a significant difference ($t(-4.7) = 8.0, p < .002$) in math performance mean score when background music was playing ($M = 38.5, SD = 15.1$) compared to the absence of background music ($M = 21.5, SD = 8.91$).

O’Sullivan (2018) reviewed previous research related to the Mozart Effect in the classroom and its effects on student moods in relation to learning. The Mozart Effect is associated with the temporary enhancement of spatial-temporal reasoning abilities immediately after listening to a piece of music by Mozart (Ivanvov and Geate, 2003). After review of Mozart Effects studies, the investigator established that the original premise of the Mozart Effect could not be verified, yet there was considerable evidence that background music may impact the learning environment (O’Sullivan, 2018). O’Sullivan (2018) continued by stating that judicious choices should be made based on the audience (i.e., students) interaction.

Incorporation of Music in the Physical Education Learning Environment

Music incorporated in a physical activity setting has been shown to be beneficial for the participant (Barney, Gust, & Liguori, 2012; Karageorghis, Jones, & Stuart, 2008; & Karageorghis & Terry, 1997). In reviewing music’s role in physical activity, Karageorghis, Terry and Lane (1999) created a conceptual framework focusing on asynchronous (i.e., absence of

57 conscious synchronization between physical movement and accompanying musical rhythm)
58 motivational (i.e., stimulates or inspire physical activity) music in the context of exercise and
59 sport. Within this framework, four factors have been identified contributing to the qualities of a
60 given piece of music: 1) rhythm response, 2) musicality, 3) cultural impact, and 4) association.
61 Rhythm response is the response to the rhythmical elements of music; key characteristics of
62 music for eliciting a bodily response. Musicality is the response to the pitch-related elements of
63 music, specifically harmony and melody. Cultural impact is the pervasiveness of the music
64 within society (i.e., the more culturally central music is within society). Finally, association is
65 specific to music evoking physical activities in individuals. Karageorghis et al. (2006) proposed
66 asynchronous motivational music leads to three psychophysical responses namely, arousal
67 control, reduced ratings of perceived exertion (RPE), and improving moods.

68 Listening to music during physical activity has been associated with longer workout
69 times and training at higher intensities. Barney, Gust, and Liguori (2012) surveyed the
70 relationship of music during workouts in college-aged students. Results indicated college-aged
71 students participated in activity for longer periods and at higher intensities when listening to
72 music. Barney and Prusak (2015) further investigated the relationship of music during physical
73 activity. Researchers examined the effects of music on physical activity rates in an elementary
74 physical education class (3rd, 4th, & 5th graders), measured with pedometers, during walking and
75 frisbee activities. Results indicated that, on average for walking activities, males took 377 more
76 steps than their female student counterparts music played. For frisbee activities, male students
77 took an average of 604 more steps than female students (370 steps) throughout the lesson when
78 music played. Brewer, Barney, Prusak, and Pennington (2016) conducted a similar study with
79 music and no music with junior high school-aged physical education students participating in

80 volleyball and basketball. On average, male students acquired 41 more steps during volleyball
81 and 220 more steps during basketball while music was playing. On average, female students
82 acquired more steps 380 during volleyball game play and 345 more steps during basketball with
83 music playing.

84 Music during physical activity may also affect a person's mood. Hayakawa, Miki,
85 Takada and Tanaka (2000) identified music's association to physical activity and a person's
86 mood state. Hayakawa, et al., evaluated the mood states of 16 subjects aged 32-60 years ($M =$
87 49.9 , $SD 7.5$) subjects' mood states utilizing the abbreviated version of the Profile of Mood
88 States (POMS) (Grove & Prapavessis, 1992). For this study, Hayakawa et al., (2000) compared
89 synchronous music and Japanese traditional folk song to no music during exercise. Significant
90 scale items specific to vigor ($F_{2,30} = 3.64$, $p < .001$), fatigue ($F_{2,30} = 5.72$, $p < .01$), and confusion
91 ($F_{2,30} = 3.12$, $p < .10$) were identified related to the type of music, or no music, and exercise.
92 Findings also indicated participants reported more positive mood traits when synchronous music
93 played compared to when no music played. Investigators continued by saying that between the
94 two types of music (synchronous and traditional Japanese music), synchronous music generated
95 more positive moods in participants. Barney, Pleban and Gishe (2016) also investigated the
96 effects of music on fourth grader student's enjoyment in two activities during physical education
97 class. Fourth grade students participated in two separate lessons, one with music and one without
98 music. Fourth grade students perceived physical education as more enjoyable when music was
99 playing during the lesson, when compared to lessons without music. However, qualitative
100 follow-up data from student interviews indicated music's association with mood. From the
101 qualitative results, one student stated, "I love PE class, but when the music was playing it made
102 what we were doing in class funner." Another student stated, "The songs were awesome. I was

103 singing along.” Student comments did not specifically mention mood, yet mentioned factors that
104 would impact mood, such as having fun and singing. Barney and Pleban (2018) qualitatively
105 examined 26 physical education teachers’ (year’s teaching experience 1-25 years) perceptions of
106 utilizing contemporary music in the classroom. Transcript reviews revealed four major themes
107 regarding the incorporation of music in the PE environment: 1) classroom management, 2)
108 student learning, 3) class climate, and 4) music as a motivational tool. Within the major themes,
109 additional sub content factors, 11 total across all four major themes, were identified (Table 1).
110 The purpose of this present study was to investigate two conditions, with/without the
111 incorporation of music, in the physical education environment on student moods.

112
113
114 Insert Table 3 Here

116 **Methods**

117 **Participants**

118 For this study, 948 junior high school students (501 males & 447 females) from one
119 intact junior high school in the Intermountain West were sampled. Student ages ranged from 11
120 to 15 years. Junior high grade levels were comprised of 7th, 8th, and 9th grade. Stratified by grade
121 level, 330 7th graders, 322 8th graders, and 296 9th graders comprised this study. Across all
122 grades, stratified by race/ethnicity, students self-identified as: 669 (70.6%) Caucasian, 205
123 (21.6%) Latino/Hispanic, 32 (3.4%) Pacific Islander, 13 (1.4%) African American, and 10
124 (1.1%) Native American.

125 **Instrumentation**

126 The instrument used for this study was an abbreviated version of the Profile of Mood
127 States (POMS) (Grove & Prapavessis, 1992). The original POMS self-report survey was created
128 by McNair, Lorr and Droppleman (1971) which incorporated descriptive words that define
129 feelings people have at a certain point in time. Subjects self-reported on each descriptive word
130 adjective using a 5-point Likert scale (0=Not at all, 1=A little, 2=Moderately, 3=Quite a Lot, and
131 4=Extremely). The survey instrument consisted of 40 mood adjectives. University Institutional
132 Board (IRB) and school district approval was obtained prior to study implementation. All
133 participants were subsequently assured that their voluntary decision to participate or not
134 participate in the study would not affect their grade in class or class standing.

135 **Setting**

136 Prior to study implementation, the investigators contacted the junior high school physical
137 educators, explaining both the purpose of the study and the survey instrument. Prior to data
138 collection, the researchers instructed each junior high school physical educator on proper survey
139 administration. The school's classes ran on block schedule, A-day/B-day with each class lasting
140 approximately 80 minutes in length, from bell to bell. Explanation, administration, and survey
141 completion took approximately 15 minutes. A 99% survey response rate was recorded.

142 **Research Design**

143 Convenience sampling was employed to collect data for this study. The study was quasi-
144 experimental, comparing two conditions, with/without the incorporation of music, during one
145 class activity (basketball) in the physical education environment on students' mood. The Profile
146 of Mood States (POMS)-Short Form is a psychological rating scale measuring six distinct mood
147 states over time. Advantages of incorporating the POMS-Short Form include ease of instrument
148 administration and quick assessment of the five-point scale. The short form of the assessment

149 was developed principally for administration to children and young adults, thus factoring into its
150 inclusion in the current study. Abbreviated POMS self-report data were collected from each of
151 the 948 participants. All data analyses were conducted using SAS software, Version 9.4 of the
152 SAS System for Windows (SAS Institute Inc., Cary, NC, USA).

153 **Results**

154 **Profile of Mood States**

155 A significant difference was observed in the mean scores of POMS between pre-
156 intervention (without music) and post-intervention (with music) (Table 2). Post intervention
157 group showed significantly lowered mean scores for total mood disturbance, tension, anger,
158 fatigue, depression and confusion (all P-values < 0.0001), while significantly higher mean scores
159 was observed for esteem related affect and vigor (P-values < 0.0001).

160
161 Insert Table 2 Here

163 **Profile of Mood States by Demographic Characteristics**

164 Total mood disturbance mean score showed improvement for all demographic
165 characteristic groups post intervention, and no statistically significant difference was observed
166 among the groups: gender (P-value = 0.1135), ethnicity (P-value=0.6569) and grade (P-
167 value=0.0611) (Table 3). Pre intervention, 7th grade students had the lowest total mood
168 disturbance mean score, while 9th grade students had the highest.

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171 Insert Table 3 Here

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Discussion

The purpose of this present study was to investigate two conditions, with/without the incorporation of music, in the physical education environment on student mood during basketball play. Present study findings suggests that music incorporated in the physical education environment may positively impact student moods. Paired sample t test data revealed seven moods (tension, anger, fatigue, depression, esteem-related affect, vigor and confusion) were positively affected when music was incorporated in this sample of junior high school physical education students during basketball play. POMS-Short Form data indicated that when the intervention of music was compared to no music, positive self-reported responses to vigor adjectives were noted. Barney, Pleban and Gishe (2016) studied the effects of music on fourth grade student’s enjoyment in two activities (toss/catch with music and hula hoop activities with no music). From qualitative interview data students stated music “gives me more energy. I know I was working harder,” and when music was playing one student reported that it got him “pumped up.” Barney and Pleban (2018) studied PE teacher’s perceptions of incorporating music in physical education lessons; qualitatively evaluating the influence of music on the classroom environment. Teachers voiced music positively affected the class climate. Some of the responses that were expressed were, “I believe music has a strong influence over our emotions, so if I’m playing happy upbeat music, my students are happy and active,” and “If a student comes in upset from another class, listening to a song they really like it can help change their mood from negative to positive, as they associate the song with happy uplifting feelings.” Other words and/or phrases captured, included: “happy,” happier,” “more excited,” and “upbeat mood.”

To note, Hayakawa et al., (2000) compared synchronous music and Japanese traditional folk song to no music during exercise and evaluated the mood states of 16 subjects aged 32-60

196 years ($M = 49.9$, $SD 7.5$). Significant scale adjectives specific to vigor and confusion were
197 reported. These findings, along with present study finds related to items of vigor and confusion,
198 may suggest more positive mood characteristics when music is played compared to when no
199 music played. In addition, Haslam and Price (1998) speculated music may have positive
200 application outside the physical education environment, in other academic classroom settings
201 (e.g., math). However, it may be hypothesized for mood to be positively impacted by the
202 incorporation of music, attention should be given to the aforementioned for factor framework
203 contributing to the qualities of a given piece of music (1. rhythm response, 2. musicality, 3.
204 cultural impact, and 4. association).

205 **Study Implications**

206 Seven mood scale items (tension, anger, fatigue, depression, esteem-related affect, vigor
207 and confusion) were identified as been positively affected when music was playing in the
208 physical education classroom. With the results from this study, physical education teachers
209 should consider implementing music during games/activities for the purpose of improving
210 student moods and subsequent activity levels. Another implication from this study is specific to
211 physical education teaching education (PETE) programs and PETE majors. Study concepts may
212 be implemented when PETE majors are immersed in their methods of teaching PE courses. After
213 didactic instruction PETE majors participate, and subsequently incorporate music, during their
214 practicums and student teaching experiences.

215 **Study Limitations**

216 This study examined self-reported mood responses without incorporating
217 biophysiological measures, Borg Scale ratings of perceived exertion (RPE), or pedometer step
218 counts. In addition, investigators have noted a number of limitations placed upon this study. For

219 this study, the participants came from one intact junior high school. Because the participants
220 came from one school, findings may not be generalized or reflective of junior high school
221 students in other junior high schools or junior high schools in other geographic regions.

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295 Table 1. List of Major Physical Education and Music Interview Themes with Sub-content
 296 Factors (from Barny & Pleban, 2018)
 297

298 Major Themes	Sub Content Factors
299 1) Classroom Management	- Starting Activities - Stopping Activities - Student Listening Queue
300 2) Student Learning	- Student Focus on Learning - Student Comfort with Learning Activity
301 3) Class Climate	- Student Preference for Contemporary Music - Creation of a Positive Classroom Atmosphere - Establishment of Positive Student Mood
302 4) Music as a Motivational Tool	- Behavioral Reward - Student Engagement - Positive Messaging

301
 302 *Note:* DOI: <https://doi.org/10.18666/TPE-2018-V75-I2-7447>

303
 Table 2. Scores of Abbreviated Profile of Mood States (POMS) Comparing pre (without) and post (with) Music during Junior High School Basketball Play

Variables	Without Music [1]	With Music [1]	P-Value [2]
Total Mood Disturbance	7.8±1.00	-12.6±0.69	<.0001
Tension	5.2±0.22	2.3±0.16	<.0001
Anger	5.1±0.23	1.9±0.15	<.0001
Fatigue	4.7±0.17	2.8±0.14	<.0001
Depression	5.9±0.29	1.7±0.16	<.0001
Esteem-related Affect	11.5±0.16	14.2±0.18	<.0001
Vigor	5.6±0.19	8.4±0.21	<.0001
Confusion	4.0±0.19	1.4±0.13	<.0001

[1] Mean ± Standard Error
 [2] Paired sample t test

Table 3. Scores of Abbreviated Profile of Mood States (POMS) Comparing pre (with out) and post (with) Music during Junior High School Basketball Play by Demographic Characteristics

Characteristics	Without Music [1]	With Music [1]	P-Value [2]
Gender			
Male	7.5±1.24	-11±0.99	0.1135
Female	8.1±1.63	-14±0.97	
Ethnicity			
African American/Asian/Native American/Pacific Islander	7.2±3.45	-9.6±2.65	0.6569
Caucasian	8.3±1.17	-13±0.83	
Latino/Hispanic	6.0±2.28	-13±1.51	
Grade			
7th Grade	4.3±1.74	-13±1.25	0.0611
8th Grade	9.1±1.63	-14±1.05	
9th Grade	10.4±1.79	-11±1.37	

[1] Mean ± Standard Error

[2] ANOVA test